WHAT IS CLAIMED IS:

1.   A method of analyzing a multi-dimensional system comprising the steps of:

generating a multi-dimensional signal for each of a plurality of channels associated

5   with the multi-dimensional system;

generating multiple dynamical profiles for each channel based on the corresponding multi-dimensional signal, where each profile reflects the dynamical characteristics of the corresponding channel in accordance with one of multiple dynamical parameters;

for a group of channels, generating a number of statistical measures, wherein each of

10   the statistical measures reflects a correlation level between corresponding dynamical profiles, and wherein each of the corresponding dynamical profiles is associated with one of the multiple dynamical parameters;

selecting at least one dynamical parameter from amongst the multiple dynamical parameters;

15   generating a statistical measure for the channel group, wherein the statistical measure reflects a correlation level between corresponding dynamical profiles associated with the selected at least one dynamical parameter; and

characterizing the behavior of the multi-dimensional system as a function of the statistical measure, generated for the channel group, that reflects the correlation level between

20   corresponding dynamical profiles associated with the selected at least one dynamical parameter.

2.   The method of claim 1, wherein each of the statistical measures generated for the channel group are a function of corresponding dynamical profiles associated with one or a

25   combination of dynamical parameters.

3.   The method of claim 1, wherein said step of selecting at least one dynamical parameter from amongst the multiple dynamical parameters comprises the step of:

selecting a combination of dynamical parameters.

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4.   The method of claim 3, wherein the combination of dynamical parameters corresponds with one of the statistical measures generated for the channel group.

5.   The method of claim 5, where in the statistical measure corresponding to the selected combination of dynamical parameters was determined to characterize the behavior of the multidimensional system better than the other statistical measures generated for the channel group.

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6.   A method of analyzing the brain comprising the steps of:

acquiring a plurality of signals, each signal representing a corresponding channel associated with a different spatial location of the brain;

generating a state-space representation for each channel as a function of a

10   corresponding one of the acquired signals;

generating a plurality of dynamical profiles from each state-space representation, wherein each of the plurality of dynamical profiles generated from a given state-space representation reflects the dynamical characteristics of the state-space representation in accordance with a corresponding one of multiple dynamical parameters;

15   generating, for each of one or more channel groups, a plurality of statistical profiles, wherein each of the plurality of statistical profiles associated with a given channel group reflects a correlation level amongst corresponding dynamical profiles associated with at least one of the multiple dynamical parameters;

selecting at least one dynamical parameter from amongst the multiple dynamical

20   parameters;

generating a statistical profile for each of one or more channel groups, wherein the statistical profile reflects a correlation level for the dynamical profiles associated with the selected at least one dynamical parameter; and

characterizing the state dynamics of the brain as a function of the statistical profile,

25   generated for each of the one or more channel groups, which reflects the correlation level of the dynamical profiles associated with the selected at least one dynamical parameter.

7.   The method of claim 6, wherein the generation of a plurality of statistical profiles for each of the one or more channel groups comprises the step of:

30   applying an X^2-statistic, wherein each of the plurality of statistical profiles comprises a sequence of X^2-index values.

8.   The method of claim 6, wherein the one or more channels are critical channel groups.

9.   The method of claim 6, wherein each of the plurality of statistical profiles generated for the one or more channel groups is based on the dynamical profiles associated with either one or a combination of dynamical parameters.

10.   The method of claim 9 further comprising the step of:

analyzing the plurality of statistical profiles generated for the one or more channel groups.

11.   The method of claim 10, wherein said step of analyzing the plurality of statistical profiles comprises the step of:

quantifying an entrainment level associated with each of the plurality of statistical profiles over a number of seizure-related events.

12.   The method of claim 11, wherein said step of selecting at least one dynamical parameter from amongst the multiple dynamical parameters comprises the step of:

identifying a dynamical parameter, wherein the entrainment level of the statistical profile corresponding to the identified dynamical parameter provides better indications of an impending seizure than the other statistical profiles generated for the one or more channel groups.

13.   The method of claim 11, wherein said step of selecting at least one dynamical parameter from amongst the multiple dynamical parameters comprises the step of:

identifying a combination of dynamical parameters, wherein the entrainment level of the statistical profile corresponding to the identified combination of dynamical parameters provides better indications of an impending seizure than the other statistical profiles generated for the one or more channel groups.

14.   The method of claim 6 further comprising the step of:

generating a seizure warning based on the state dynamics of the brain.

15.   The method of claim 6 further comprising the step of:

generating a seizure prediction based on the state dynamics of the brain.

16.   A system for analyzing the brain comprising:

means for acquiring a plurality of signals from different regions of the brain, each signal reflecting a spatio-temporal response associated with a corresponding region, wherein each signal and its corresponding region are associated with a different one of a plurality of channels;

means for generating a state-space representation for each channel as a function of the corresponding signal;

for each channel, generating a plurality of dynamical profiles from the corresponding state-space representation, wherein each of the plurality of dynamical profiles generated from a given channel reflects the dynamical characteristics of the corresponding state-space representation in accordance with a corresponding one of multiple dynamical parameters;

means for generating, for each of one or more channel groups, a plurality of statistical profiles, wherein each of the plurality of statistical profiles associated with a given channel group reflects a correlation level amongst corresponding dynamical profiles associated with the given channel group and with at least one of the multiple dynamical parameters;

means for selecting at least one dynamical parameter from amongst the multiple dynamical parameters;

means for generating a statistical profile for each of one or more channel groups, wherein the statistical profile reflects a correlation level for the dynamical profiles associated with the selected at least one dynamical parameter; and

means for characterizing the state dynamics of the brain as a function of the statistical profile, generated for each of the one or more channel groups, which reflects the correlation level of the dynamical profiles associated with the selected at least one dynamical parameter.

17.   The system of claim 16, wherein said means for generating the plurality of statistical profiles for each of the one or more channel groups comprises:

means for applying an X^2-statistic, wherein each of the plurality of statistical profiles comprises a sequence of X^2-index values.

18.   The system of claim 16, wherein said means for generating the plurality of statistical profiles for each of the one or more channel groups comprises:

means for generating the plurality of statistical profiles based on the dynamical profiles associated with one or a combination of dynamical parameters.

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19.   The system of claim 18 further comprising:

means for analyzing the plurality of statistical profiles generated for the one or more channel groups.

10   20.   The system of claim 19, wherein said means for analyzing the plurality of statistical profiles comprises:

means for quantifying an entrainment level associated with each of the plurality of statistical profiles over a number of seizure-related events.

15   21.   The system of claim 20, wherein said means for selecting at least one dynamical parameter comprises:

means for identifying a dynamical parameter, wherein the entrainment level of the statistical profile corresponding to the identified dynamical parameter provides better indications of an impending seizure than the other statistical profiles generated for the one or 20   more channel groups.

22.   The system of claim 20, wherein said means for selecting at least one dynamical parameter from amongst the multiple dynamical parameters comprises:

means for identifying a combination of dynamical parameters, wherein the 25   entrainment level of the statistical profile corresponding to the identified combination of dynamical parameters provides better indications of an impending seizure than the other statistical profiles generated for the one or more channel groups.

23.   The system claim 16 further comprising:

30   means for generating a seizure warning based on the state dynamics of the brain.

24.   The system of claim 16 further comprising:

means for generating a seizure prediction based on the state dynamics of the brain.